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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
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 Washington, D.C.20231
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in its capacity as elected Office

Date of mailing (day/month/year)

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International application No.

PCT/AU99/01033

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FP11439/BJN

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25 November 1999 (25.11.99)

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22 December 1998 (22.12.98)

Applicant

REINHARD, Judith et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

28 June 2000 (28.06.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 04 APR 2001

WIPO

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Applicant's or agent's file reference FP11439	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/AU99/01033	International Filing Date (day/month/year) 25 November 1999	Priority Date (day/month/year) 22 December 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ A01N 31/16		
Applicant COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION <i>et al.</i>		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of 3 sheets, including this cover sheet. <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 22 sheet(s).
3.	This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 28 June 2000	Date of completion of the report 29 March 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer NORMAN BLOM Telephone No. (02) 6283 2238

I. Basis of the report

1. With regard to the **elements** of the international application:*
- ☐ the international application as originally filed.
- ☒ the description, pages **1-3, 10, 13-22**, as originally filed,
pages , filed with the demand,
pages **4,4/1,11,11/1,12,12/1**, received on **19 September 2000** with the letter of **19 September 2000**
pages **5-9**, received on **5 December 2000** with the letter of **29 November 2000**
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages **23,27-33**, received on **19 September 2000** with the letter of **19 September 2000**
pages **24-26**, received on **5 December 2000** with the letter of **29 November 2000**
- ☐ the drawings, pages , as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of
2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-67	YES
	Claims none	NO
Inventive step (IS)	Claims 1-67	YES
	Claims none	NO
Industrial applicability (IA)	Claims 1-67	YES
	Claims none	NO

2. Citations and explanations (Rule 70.7)

Novelty (N) and Inventive Step (IS): Claims 1-67

The claims are considered to be novel and inventive in the light of any one or more document cited in the International Search Report. The present invention is considered to be distinguished from the citations for the reasons given below:-

Patent Abstracts of Japan, C-856, page 10, **JP 03-112903 A** (Nitto Denko Corp) 14 May 1991 discloses a termite trail pheromone preparation comprising **hydroquinone or catechol** (0.01-0.1 parts by weight), (3Z,6Z,8E)-dodecatrienol (1 part by weight) in a synthetic resin (20-1000 parts by weight). The **catechol or hydroquinone** is said function as a stabilizing agent for the preparation (most likely to inhibit oxidation of the (3Z,6Z,8E)-dodecatrienol, a *Reticulitermes* trail pheromone, as these compounds are both well known antioxidants). There is no suggestion that either of these two compounds possess **feeding stimulant activity** or that they are used for any purpose other than that of a stabilizing agent.

US 5,756,114 teaches that resorcylic acid, protocatechuic acid and vanillic acid, are food odor attractants. There is no suggestion that these compounds possess any feeding stimulating activity.

JP 05255007, JP 1056606, DE 4231045, AU 10625/83, Chemical abstracts (1982), 97, 222-223, abstract 122002a and JP 58-157703 all disclose the use of various optionally substituted dihydroxyaryl compounds for the eradication of termites. None of these compounds is indicated to possess any **feeding stimulating activity**.

Claims 1-21 are considered to be novel and inventive in the light of the commercially available pure compounds, such as catechol, dimethoxybenzene, hydroquinone, methoxyphenol, phenoxyphenol, phenylhydroquinone, phloroglucinol, quinhydrone, resorcinol, poly-meta-phenoxyethylene, arbutin, etc because these chemicals are in far higher concentrations than that found to be effective to elicit feeding activity. Further, there is some evidence that, under certain conditions, some of these compounds (hydroquinone or catechol) may act as insecticides (see **JP 58-157703**).

elicited feeding behaviour when applied without food onto glass plates. These extracts were tested with both *Reticulitermes santonensis* and *Schedorhinotermes lamanianus* and proved to elicit a significant feeding preference in the two species. In view of this, Reinhard et al. suggested that the signal function of the labial gland secretion for food exploitation is phylogenetically old and non-species specific. The chemical signal has now been identified for the first time and has proved to work as a powerful feeding stimulant at natural low concentrations on a wide range of termite species. In view of this a class of compounds which stimulate termite feeding has been identified.

15 **DISCLOSURE OF THE INVENTION**

According to a first aspect of the present invention there is provided a feeding stimulant for stimulating feeding activity in termites, comprising an effective amount of a compound capable of stimulating feeding activity in termites, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, and a biologically acceptable carrier and/or extender.

25 Where the feeding stimulant is a compound in which at least one R is an organic group it may have feeding stimulating activity or may be a pre-cursor of a compound with feeding stimulating activity.

In the former case, the organic group is preferably selected from the group consisting of alkyl, substituted alkyl, aryl or substituted aryl, and in the latter case is typically a compound which is hydrolysed to one having feeding stimulating activity, such as those in which the

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such compound. Polymers or oligomers such as polyphenylethers, as well as being long-lived in the

transported into the nest by foragers and there distributed throughout the colony either via food exchange or mutual grooming between the nest mates.

According to a fifth aspect of the present invention
5 there is provided a termiticidal composition comprising:

- (1) a termiticidal substance; and
- (2) a feeding stimulant as described above.

According to a sixth aspect of the present invention
there is provided a compound having at least two OR groups,
10 each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used for stimulating feeding activity in termites.

According to a seventh aspect of the present invention
15 there is provided a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used in an amount effective to stimulate feeding activity in termites to attract termites to a
20 locus.

According to an eighth aspect of the present invention
there is provided the use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
25 compounds thereof, in stimulating feeding activity in termites.

According to a ninth aspect of the present invention
there is provided the use in an amount effective to stimulate feeding activity in termites of a compound
30 capable of stimulating feeding activity in termites, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, to attract

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termites to a locus.

According to a tenth aspect of the present invention there is provided the use in an amount effective to stimulate feeding activity in termites of a compound
5 capable of stimulating feeding activity in termites in the manufacture of a bait for attracting termites, said compound having at least two OR groups, each of which is a substituent of

an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

According to an eleventh aspect of the present invention there is provided the use in an amount effective
5 to stimulate feeding activity in termites of a compound capable of stimulating feeding activity in termites in the manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an
10 organic group, and addition compounds thereof.

According to a twelfth aspect of the present invention there is provided a method of stimulating feeding activity in termites, comprising the steps of:

(1) providing a compound effective in stimulating
15 feeding activity in termites having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof; and

(2) applying said compound to a locus.

20 Typically, the compound having at least two OR groups is a compound of general formula I as described above.

It has been found that para-hydroquinone is the natural feeding stimulant, but exists in the labial glands of termites almost entirely as its glucose conjugate, 4-
25 hydroxyphenyl- β -D-glucopyranoside, which is commonly called β -arbutin. β -Arbutin and glucose conjugates of the other compounds of general formula I may also be used in the invention described above. In particular, β -arbutin or glucose conjugates of the other compounds of formula I can
30 be incorporated into a bait matrix and, through slow decay generating an active compound of general formula I, could act as a slow-release system.

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BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the invention will now be described, by way of example only, with reference to the following examples.

5 **Example 1 - Use of Labial Glands Extracts as Termite Attractants**

In order to prepare labial gland extracts, termites were killed and the paired labial glands were removed. The labial glands were disrupted by freezing them for 15
10 minutes at -20°C and extracted with 0.6 ml of water for 12

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A feeding stimulant for stimulating feeding activity in termites, comprising an effective amount of a compound capable of stimulating feeding activity in termites, said
5 compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, and a biologically acceptable carrier and/or extender.
- 10 2. A feeding stimulant as claimed in claim 1 wherein at least one R is an organic group and said compound has feeding stimulating activity.
3. A feeding stimulant as claimed in claim 2 wherein said
15 organic group is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl.
4. A feeding stimulant as claimed in claim 1 wherein at
20 least one R is an organic group and said compound is a precursor of a compound with feeding stimulating activity.
5. A feeding stimulant as claimed in claim 4 wherein said
25 compound is hydrolysed to a compound in which said at least one R is hydrogen.
6. A feeding stimulant as claimed in claim 5 wherein said organic group is a carbohydrate moiety.
- 30 7. A feeding stimulant as claimed in claim 6 wherein said compound is β -arbutin.

claims 1 to 21.

26. A bait as claimed in claim 25 wherein said food source is a source of cellulose.

5

27. A bait as claimed in claim 26 wherein said food source is selected from the group consisting of paper, cardboard, canite, chipboard, sound wood and fungally decayed wood.

10

28. A bait as claimed in any one of claims 25 to 27 further comprising a termiticidal substance.

29. A bait as claimed in claim 28 in which said termiticidal substance is a chitin synthesis inhibitor or an insect growth regulator.

15

30. A bait as claimed in any one of claims 25 to 29 further comprising an antioxidant.

20

31. A bait as claimed in any one of claims 25 to 30 further comprising a synergist and/or other attractants.

32. A bait as claimed in any one of claims 25 to 31 further comprising nutrients such as nitrogen-containing compounds and carbohydrates.

25

33. A termiticidal composition comprising:

(1) a termiticidal substance; and

(2) a feeding stimulant as claimed in any one of claims 1 to 21.

30

34. A termiticidal composition as claimed in claim 33 wherein said termiticidal substance is a chitin synthesis inhibitor or insect growth regulator.

5 35. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used for stimulating feeding activity in termites.

10 36. A compound as claimed in claim 35 of general formula I as defined in claim 9.

37. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen
15 or an organic group, and addition compounds thereof, when used in an amount effective to stimulate feeding activity in termites to attract termites to a locus.

38. A compound as claimed in claim 37 of general formula
20 I as defined in claim 9.

39. The use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds
25 thereof, in stimulating feeding activity in termites.

40. The use of a compound as claimed in claim 39 wherein said compound is of general formula I as defined in claim 9.

30

41. The use in an amount effective to stimulate feeding activity in termites of a compound capable of stimulating feeding activity in termites, said compound having at least

two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, to attract termites to a locus.

5 42. The use of a compound as claimed in claim 41 wherein said compound is of general formula I as defined in claim 9.

10 43. The use in an amount effective to stimulate feeding activity in termites of a compound capable of stimulating feeding activity in termites in the manufacture of a bait for attracting termites, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
15 compounds thereof.

20 44. The use of compound as claimed in claim 43 wherein said compound is of general formula I as defined in claim 9.

25 45. The use in an amount effective to stimulate feeding activity in termites of a compound capable of stimulating feeding activity in termites in the manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
30 compounds thereof.

30 46. The use of a compound as claimed in claim 45 wherein said compound is of general formula I as defined in claim 9.

47. A method of stimulating feeding activity in termites, comprising the steps of:

(1) providing a compound effective in stimulating feeding activity in termites having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof; and

(2) applying said compound to a locus.

48. A method as claimed in claim 47 wherein at least one R is an organic group and said compound has feeding stimulating activity.

49. A method as claimed in claim 48 wherein said organic group is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl.

50. A method as claimed in claim 47 wherein at least one R is an organic group and said compound is a precursor of a compound with feeding stimulating activity.

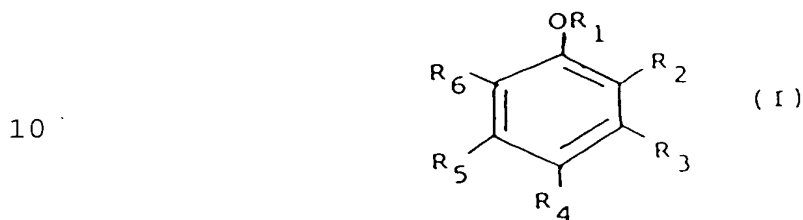
51. A method as claimed in claim 50 wherein said compound is hydrolysed to a compound in which said at least one R is hydrogen.

52. A method as claimed in claim 51 wherein said organic group is a carbohydrate moiety.

53. A method as claimed in claim 52 wherein said compound is β -arbutin.

54. A method as claimed in claim 47 wherein said compound has an aromatic nucleus substituted by said at least two OR groups.

5 55. A method as claimed in claim 54 wherein said compound has the following general formula I:



wherein R₁ is selected from the group consisting of
15 hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl;

R₂, R₃, R₄, R₅ and R₆ are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, alkaryl, substituted alkaryl, alkaryloxy and substituted alkaryloxy,
20 or R₂ and R₃ together, R₃ and R₄ together, R₄ and R₅ together and/or R₅ and R₆ together form an aryl group;

provided only that least one of R₂, R₃, R₄, R₅ or R₆ is
25 hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, alkaryloxy or substituted alkaryloxy.

56. A method as claimed in claim 55 wherein R₁ is selected from the group consisting of hydrogen, alkyl, aryl and
30 alkaryl.

57. A method as claimed in claim 56 wherein R₁ is selected from the group consisting of hydrogen, methyl, ethyl,

phenyl and benzyl.

58. A method as claimed in claim 57 wherein R_1 is hydrogen.

5 59. A method as claimed in claim 54 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, alkaryl, and alkaryloxy.

10 60. A method as claimed in claim 58 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

15 61. A method as claimed in claim 60 wherein R_2 or R_6 is hydroxyl.

62. A method as claimed in claim 60 wherein R_3 or R_5 is hydroxyl.

20

63. A method as claimed in claim 60 wherein R_4 is hydroxyl.

25 64. A method as claimed in claim 47 wherein said compound is selected from the group consisting of:

p-hydroquinone

quinhydrone

catechol

resorcinol

30 phloroglucinol

4-methoxyphenol

methoxyhydroquinone

1,4-dimethoxybenzene

4-phenoxyphenol
phenylhydroquinone
4-benzyloxyphenol

5 65. A method as claimed in claim 47 wherein said compound
has a plurality of aryl moieties.

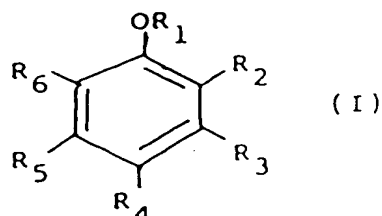
66. A method as claimed in claimed 42 wherein each said
aryl moiety is a benzene ring.

10

67. A method as claimed in claim 43 wherein said compound
is a polyphenylether.

8. A feeding stimulant as claimed in claim 1 wherein said aryl group is a benzene ring substituted by said at least two OR groups.

9. A feeding stimulant as claimed in claim 8 wherein said compound has the following general formula I:



10

wherein R_1 is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl;

R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, aralkyl, substituted aralkyl, aralkyloxy and substituted aralkyloxy, or R_2 and R_3 together, R_3 and R_4 together, R_4 and R_5 together and/or R_5 and R_6 together form an aryl group;

provided only that least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, aralkyloxy or substituted aralkyloxy.

10. A feeding stimulant as claimed in claim 9 wherein R_1 is selected from the group consisting of hydrogen, alkyl, aryl and aralkyl.

30

11. A feeding stimulant as claimed in claim 10 wherein R_1 is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

12. A feeding stimulant as claimed in claim 11 wherein R_1 is hydrogen.

13. A feeding stimulant as claimed in claim 9 wherein R_2 ,
5 R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, aralkyl, and aralkyloxy.

14. A feeding stimulant as claimed in claim 13 wherein R_2 ,
10 R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

15. A feeding stimulant as claimed in claim 14 wherein R_2
15 or R_6 is hydroxyl.

16. A feeding stimulant as claimed in claim 14 wherein R_3 or R_5 is hydroxyl.

17. A feeding stimulant as claimed in claim 14 wherein R_4
20 is hydroxyl.

18. A feeding stimulant as claimed in claim 1 wherein said compound is selected from the group consisting of:

25 p-hydroquinone
quinhydrone
catechol
resorcinol
phloroglucinol
30 4-methoxyphenol
methoxyhydroquinone
1,4-dimethoxybenzene

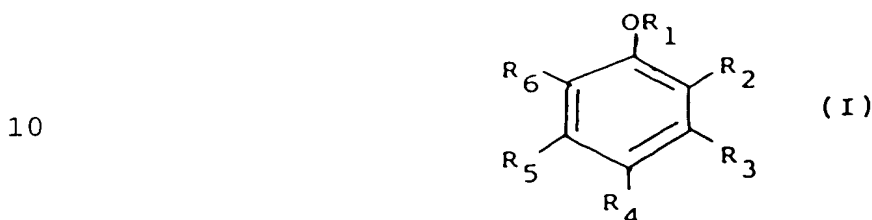
4-phenoxyphenol
phenylhydroquinone
4-benzyloxyphenol

- 5 19. A feeding stimulant as claimed in claim 1 wherein said compound has a plurality of aryl moieties.
20. A feeding stimulant as claimed in claimed 19 wherein each said aryl moiety is a benzene ring.
- 10 21. A feeding stimulant as claimed in claim 20 wherein said compound is a polyphenylether.
22. A method of stimulating feeding activity in termites,
15 comprising the steps of:
 (1) providing a feeding stimulant as claimed in any one of claims 1 to 21; and
 (2) applying said feeding stimulant to a locus.
- 20 23. A method as claimed in claim 22 further comprising the step of providing a food source at said locus.
24. A method of attracting termites to a locus, comprising the steps of:
25 (1) providing a food source at said locus;
 (2) providing a feeding stimulant as claimed in any one of claims 1 to 21; and
 (3) applying said feeding stimulant to said locus.
- 30 25. A bait for attracting termites, comprising:
 (1) a food source; and
 (2) a feeding stimulant as claimed in any one of claims 1 to 21.

environment, will progressively hydrolyse to compounds having feeding stimulating activity.

Compounds having feeding stimulating activity typically comprise a benzene ring substituted by said at
5 least two OR groups.

Typically such compounds have the following general formula I:



15 wherein R₁ is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl, and substituted aralkyl;

R₂, R₃, R₄, R₅ and R₆ are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, aralkyl, substituted aralkyl, aralkyloxy and substituted aralkyloxy,
20 or R₂ and R₃ together, R₃ and R₄ together, R₄ and R₅ together and/or R₅ and R₆ together form an aryl group;

25 provided only that at least one of R₂, R₃, R₄, R₅ or R₆ is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, aralkyloxy or substituted aralkyloxy.

Preferably, R₁ is selected from the group consisting of hydrogen, alkyl, aryl and aralkyl.

30 More preferably, R₁ is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

More preferably still, R₁ is hydrogen.

Preferably, R₂, R₃, R₄, R₅ and R₆ are independently

selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, aralkyl, and aralkyloxy.

More preferably, R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of
5 hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

More preferably still, at least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl. In particular, R_2 or R_6 , R_3 or R_5 or R_4 is typically hydroxyl.

10 Particularly preferred compounds for use in the present invention are selected from the group consisting of:

p-hydroquinone (1,4-dihydroxybenzene)
catechol (1,2-dihydroxybenzene)
15 resorcinol (1,3-dihydroxybenzene)
phloroglucinol (1,3,5-trihydroxybenzene)
4-methoxyphenol
methoxyhydroquinone (1-methoxy-2,5-dihydroxybenzene)
1,4-dimethoxybenzene
20 4-phenoxyphenol
phenylhydroquinone
4-benzyloxyphenol

Moreover, addition compounds such as quinhydrone (an addition compound of 1 mole hydroquinone and 1 mole
25 quinone) are also envisaged.

Alternatively, said compound may have a plurality of aryl moieties.

Preferably each said aryl moiety is a benzene ring and the compound is a polyphenylether. Typically, the
30 polyphenylether is an ether of p-hydroquinone having between 2 and 5 p-hydroquinone residues.

As used throughout the specification and claims the term "alkyl" refers to straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

5 As used throughout the specification and claims the term "substituted alkyl" refers to an alkyl radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen,
10 alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification the term "aryl" refers to a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the
15 heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryl" refers to an aryl radical substituted by any substituent, conveniently, by alkyl,
20 hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "alkoxy" refers to an alkoxy radical containing a
25 straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

As used throughout the specification and claims the term "substituted alkoxy" refers to an alkoxy radical substituted by any substituent, conveniently, by hydroxyl,
30 alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "aryloxy" refers to an aryloxy radical containing a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryloxy" refers to an aryloxy radical substituted by any substituent, conveniently, by alkyl, hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "aralkyl" refers to an aralkyl radical comprising a straight or branched chain alkylene radical, preferably a C₁-C₁₀ alkylene radical and, more preferably, a C₁-C₄ alkylene radical and a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aralkyl" refers to an aralkyl radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "aralkyloxy" refers to an aralkyloxy radical containing a straight or branched chain alkyleneoxy group, preferably a C₁-C₁₀ alkyleneoxy group and, more preferably, C₁-C₄ alkyleneoxy group, and a six-membered carbocyclic

aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

5 As used throughout the specification and claims the term "substituted aralkyloxy" refers to an aralkyloxy radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino,
10 halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims, the words "comprise", "comprises" and "comprising" are used in a non-exclusive sense, except where the context requires otherwise.

15 According to a second aspect of the present invention there is provided a method of stimulating feeding activity in termites, comprising the steps of:

(1) providing a feeding stimulant as described above; and

20 (2) applying said feeding stimulant to a locus.
Preferably, there is a food source at said locus.

According to a third aspect of the present invention there is provided a method of attracting termites to a locus, comprising the steps of:

25 (1) providing a food source at said locus,

(2) providing a feeding stimulant as described above; and

(3) applying said feeding stimulant to said locus.

The compounds of general formula I act as a feeding
30 stimulant and/or attractant to termite species, in particular, to *Mastotermes darwiniensis*, *Coptotermes acinaciformis*, *Kalotermes flavicollis*, *Cryptotermes brevis*, *Hodotermes mossambicus*, *Zootermopsis angusticollis*,

INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/AU 99/01033

A. CLASSIFICATION OF SUBJECT MATTER																						
Int Cl ⁶ : A01N 31/16																						
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B. FIELDS SEARCHED																						
Minimum documentation searched (classification system followed by classification symbols) A01N 31/16																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU IPC as above																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Derwent (WPAT), Chemical Abstracts and Agricola (termite AND (arbutin OR hydroquinone OR quinhydrone OR catechol OR resorcinol OR phloroglucinol OR dimethoxybenzene OR polyphenyl ether)																						
C. DOCUMENTS CONSIDERED TO BE RELEVANT																						
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X	Patent Abstract of Japan, C-856, page 10, JP 03-112903 A (NITTO DENKO CORP) 14 May 1991 (see entire abstract)	38-39, 42-43																				
X	AU-B-10625/83 (563232) (Montedison S.p.A.) 28 July 1983 (see entire specification, in particular page 4 lines 27-32 and claim 1)	46-47																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex																						
* Special categories of cited documents: <table border="0"> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family	"P"	document published prior to the international filing date but later than the priority date claimed		
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Date of the actual completion of the international search 11 January 2000		Date of mailing of the international search report 18 JAN 2000																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE. PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer NORMAN BLOM Telephone No.: (02) 6283 2238																				

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 99/01033

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Chemical Abstracts, (1982), 97(15), 222-223, abstract no 122002a, Columbus, Ohio, USA, (Yaga Shiryo, "Termite resistance of Okinawan timbers. VIII. New termite control agents from reduced benzoic acid derivatives", <i>Mokuzai Gakkaishi</i> (1982), 28(6), 393-398 (Japanese)). (see entire abstract)	46-47
X	Derwent Abstract Accession No 89-110592/15, Class C03, JP 01056606 A (TOHOKU KAKO KK) 3 March 1989 (see entire abstract)	46-47
X	Derwent Abstract Accession No 94-102240/13, Class C03, DE 4231045 A (DESOWAG MATERIALSCHUTZ GMBH) 24 March 1994 (see entire abstract)	46-47
X	Derwent Abstract Accession No 93-348296/44, Class C03, JP 05255007 A (Tufty GmbH) 5 October 1993 (see entire abstract)	46-47
X	Aldrich Catalog Handbook of Fine Chemicals 1990-1991, Aldrich Chemical Company, Inc, Milwaukee, Wisconsin, USA (see product numbers P3,800-5 (phloroglucinol, page 1054), H1,790-2 (hydroquinone, page 717), 28,296-0 (quinhydrone, page 1127), 13,501-1 (catechol, page 268), R40-6 (resorcinol, page 1132), M1,865-5 (4-methoxyphenol, page 842), D13,135-0 (dimethoxybenzene, page 491), 23,066-9 (4-phenoxyphenol, page 1029), 22,781-1 (phenylhydroquinone, page 1041)) (see product number 23,664-0 (1,4-dihydroxynaphthalene, page 479)	1-5, 8-18 19-20
X	Kodak Catalog no. 46, Eastman Organic Chemicals, Rochester, New York, USA 1971 (see product number 11206 (poly-m-phenoxylenes, page 159)	21
X	Sigma Chemical Company Catalog of Biochemicals Organic Compounds for Research, 1993 (see product number A4256 (arbutin, page 126)	6-7

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU 99/01033

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
DE	4231045	FR	265539				
AU	10625/83	BR	8300306	IT	8219237	JP	58128302
		ZA	8300399	CH	643223		
JP	58157703	NONE					
JP	03112903	NONE					
JP	01056606	NONE					
JP	05255007	NONE					
							END OF ANNEX

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 99/01033

A. CLASSIFICATION OF SUBJECT MATTER		
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Derwent (WPAT), Chemical Abstracts and Agricola (termite AND (arbutin OR hydroquinone OR quinhydrone OR catechol OR resorcinol OR phloroglucinol OR dimethoxybenzene OR polyphenyl ether)		
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Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer NORMAN BLOM Telephone No.: (02) 6283 2238

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JP	03112903	NONE					
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A01N 31/16	A1	(11) International Publication Number: WO 00/36914 (43) International Publication Date: 29 June 2000 (29.06.00)
(21) International Application Number: PCT/AU99/01033 (22) International Filing Date: 25 November 1999 (25.11.99) (30) Priority Data: PP 7842 22 December 1998 (22.12.98) AU (71) Applicant (for all designated States except US): COMMON-WEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION [AU/AU]; Limestone Avenue, Campbell, ACT 2612 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): REINHARD, Judith [DE/DE]; Albrechstrasse 97, D-12167 Berlin (DE). LACEY, Michael, James [AU/AU]; 41 Glasgow Street, Hughes, ACT 2605 (AU). LENZ, Michael [AU/AU]; 8 Suttor Street, Ainslie, ACT 2602 (AU). (74) Agent: GRIFFITH HACK; G.P.O. Box 3125, Brisbane, QLD 4001 (AU).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: TERMITE ATTRACTANT AND/OR FEEDING STIMULANT		
(57) Abstract A feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.		

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elicited feeding behaviour when applied without food onto glass plates. These extracts were tested with both *Reticulitermes santonensis* and *Schedorhinotermes lamanianus* and proved to elicit a significant feeding preference in the two species. In view of this, Reinhard et al. suggested that the signal function of the labial gland secretion for food exploitation is phylogenetically old and non-species specific. The chemical signal has now been identified for the first time and has proved to work as a powerful feeding stimulant at natural low concentrations on a wide range of termite species. In view of this a class of compounds which stimulate termite feeding has been identified.

15 DISCLOSURE OF THE INVENTION

According to a first aspect of the present invention there is provided a feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

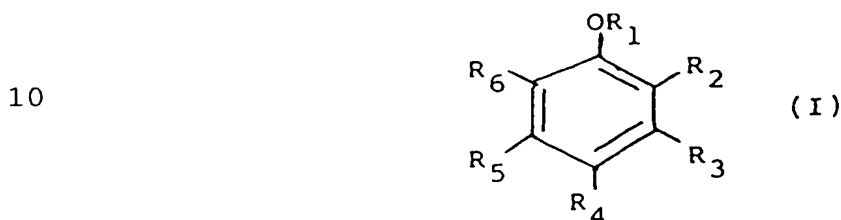
Where the feeding stimulant is a compound in which at least one R is an organic group it may have feeding stimulating activity or may be a pre-cursor of a compound with feeding stimulating activity.

In the former case, the organic group is preferably selected from the group consisting of alkyl, substituted alkyl, aryl or substituted aryl, and in the latter case is typically a compound which is hydrolysed to one having feeding stimulating activity, such as those in which the organic group is a carbohydrate moiety. β -Arbutin is one such compound. Polymers or oligomers such as polyphenylethers, as well as being long-lived in the

environment, will progressively hydrolyse to compounds having feeding stimulating activity.

Compounds having feeding stimulating activity typically have an aromatic nucleus substituted by said at
5 least two OR groups.

Typically such compounds have the following general formula I:



15 wherein R₁ is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl, and substituted aralkyl;

R₂, R₃, R₄, R₅ and R₆ are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, alkaryl, substituted alkaryl, alkaryloxy and substituted alkaryloxy, or R₂ and R₃ together, R₃ and R₄ together, R₄ and R₅ together and/or R₅ and R₆ together form an aryl group;

25 provided only that at least one of R₂, R₃, R₄, R₅ or R₆ is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, alkaryloxy or substituted alkaryloxy.

Preferably, R₁ is selected from the group consisting of hydrogen, alkyl, aryl and alkaryl.

30 More preferably, R₁ is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

More preferably still, R₁ is hydrogen.

Preferably, R₂, R₃, R₄, R₅ and R₆ are independently

selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, alkaryl, and alkaryloxy.

More preferably, R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of
5 hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

More preferably still, at least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl. In particular, R_2 or R_6 , R_3 or R_5 or R_4 is typically hydroxyl.

10 Particularly preferred compounds for use in the present invention are selected from the group consisting of:

p-hydroquinone (1,4-dihydroxybenzene)
catechol (1,2-dihydroxybenzene)
15 resorcinol (1,3-dihydroxybenzene)
phloroglucinol (1,3,5-trihydroxybenzene)
4-methoxyphenol
methoxyhydroquinone (1-methoxy-2,5-dihydroxybenzene)
1,4-dimethoxybenzene
20 4-phenoxyphenol
phenylhydroquinone
4-benzyloxyphenol

Moreover, addition compounds such as quinhydrone (an addition compound of 1 mole hydroquinone and 1 mole
25 quinone) are also envisaged.

Alternatively, said compound may have a plurality of aryl moieties.

Preferably each said aryl moiety is a benzene ring and the compound is a polyphenylether. Typically, the
30 polyphenylether is an ether of p-hydroquinone having between 2 and 5 p-hydroquinone residues.

The composition may further comprise a biologically acceptable carrier and/or extender.

As used throughout the specification and claims the term "alkyl" refers to straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

5 As used throughout the specification and claims the term "substituted alkyl" refers to an alkyl radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen,
10 alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification the term "aryl" refers to a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the
15 heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryl" refers to an aryl radical substituted by any substituent, conveniently, by hydroxyl,
20 alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "alkoxy" refers to an alkoxy radical containing a
25 straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

As used throughout the specification and claims the term "substituted alkoxy" refers to an alkoxy radical substituted by any substituent, conveniently, by hydroxyl,
30 alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "aryloxy" refers to an aryloxy radical containing a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3
5 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryloxy" refers to an aryloxy radical
10 substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the
15 term "alkaryl" refers to an alkaryl radical comprising a straight or branched chain alkylene radical, preferably a C₁-C₁₀ alkylene radical and, more preferably, a C₁-C₄ alkylene radical and a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring
20 containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted alkaryl" refers to an alkaryl radical
25 substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the
30 term "alkaryloxy" refers to an alkaryloxy radical containing a straight or branched chain alkyleneoxy group, preferably a C₁-C₁₀ alkyleneoxy group and, more preferably, C₁-C₄ alkyleneoxy group, and a six-membered carbocyclic

aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

5 As used throughout the specification and claims the term "substituted alkaryloxy" refers to an alkaryloxy radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino,
10 halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims, the words "comprise", "comprises" and "comprising" are used in a non-exclusive sense, except where the context requires otherwise.

15 According to a second aspect of the present invention there is provided a method of stimulating feeding activity in termites, comprising the steps of:

(1) providing a feeding stimulant as described above; and

20 (2) applying said feeding stimulant to a locus.

Preferably, there is a food source at said locus.

According to a third aspect of the present invention there is provided a method of attracting termites to a locus, comprising the steps of:

25 (1) providing a food source at said locus,

(2) providing a feeding stimulant as described above; and

(3) applying said feeding stimulant to said locus.

30 The compounds of general formula I act as a feeding stimulant and/or attractant to termite species, in particular, to *Mastotermes darwiniensis*, *Coptotermes acinaciformis*, *Kalotermes flavicollis*, *Cryptotermes brevis*, *Hodotermes mossambicus*, *Zootermopsis angusticollis*,

transported into the nest by foragers and there distributed throughout the colony either via food exchange or mutual grooming between the nest mates.

According to a fifth aspect of the present invention
5 there is provided a termiticidal composition comprising:

- (1) a termiticidal substance; and
- (2) a feeding stimulant as described above.

According to a sixth aspect of the present invention
there is provided a compound having at least two OR groups,
10 each of which is a substituent of an aryl moiety, and R is
hydrogen or an organic group, and addition compounds
thereof, when used for stimulating feeding activity in
termites.

According to a seventh aspect of the present invention
15 there is provided a compound having at least two OR groups,
each of which is a substituent of an aryl moiety, and R is
hydrogen or an organic group, and addition compounds
thereof, when used to attract termites to a locus.

According to an eighth aspect of the present invention
20 there is provided the use of a compound having at least two
OR groups, each of which is a substituent of an aryl
moiety, and R is hydrogen or an organic group, and addition
compounds thereof, in stimulating feeding activity in
termites.

25 According to a ninth aspect of the present invention
there is provided the use of a compound having at least two
OR groups, each of which is a substituent of an aryl
moiety, and R is hydrogen or an organic group, and addition
compounds thereof, in attracting termites to a locus.

30 According to a tenth aspect of the present invention
there is provided the use of a compound in the manufacture
of a bait for attracting termites, said compound having at
least two OR groups, each of which is a substituent of an

aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

According to an eleventh aspect of the present invention there is provided the use of a compound in the manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

Typically, the compound having at least two OR groups is a compound of general formula I as described above.

It has been found that para-hydroquinone is the natural feeding stimulant, but exists in the labial glands of termites almost entirely as its glucose conjugate, 4-hydroxyphenyl- β -D-glucopyranoside, which is commonly called β -arbutin. β -Arbutin and glucose conjugates of the other compounds of general formula I may also be used in the invention described above. In particular, β -arbutin or glucose conjugates of the other compounds of formula I can be incorporated into a bait matrix and, through slow decay generating an active compound of general formula I, could act as a slow-release system.

BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the invention will now be described, by way of example only, with reference to the following examples.

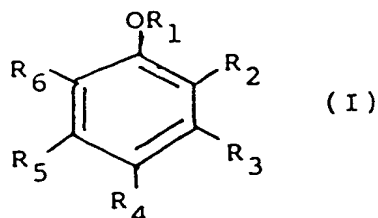
Example 1 - Use of Labial Glands Extracts as Termite Attractants

In order to prepare labial gland extracts, termites were killed and the paired labial glands were removed. The labial glands were disrupted by freezing them for 15 minutes at -20°C and extracted with 0.6 ml of water for 12

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety,
5 and R is hydrogen or an organic group, and addition compounds thereof.
2. A feeding stimulant as claimed in claim 1 wherein at least one R is an organic group and said compound has
10 feeding stimulating activity.
3. A feeding stimulant as claimed in claim 2 wherein said organic group is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, aralkyl
15 and substituted aralkyl.
4. A feeding stimulant as claimed in claim 1 wherein at least one R is an organic group and said compound is a precursor of a compound with feeding stimulating activity.
20
5. A feeding stimulant as claimed in claim 4 wherein said compound is hydrolysed to a compound in which said at least one R is hydrogen.
- 25 6. A feeding stimulant as claimed in claim 5 wherein said organic group is a carbohydrate moiety.
7. A feeding stimulant as claimed in claim 6 wherein said compound is β -arbutin.
30
8. A feeding stimulant as claimed in claim 1 wherein said compound has an aromatic nucleus substituted by said at least two OR groups.

9. A feeding stimulant as claimed in claim 8 wherein said compound has the following general formula I:



10 wherein R_1 is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl;

R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, alkaryl, substituted alkaryl, alkaryloxy and substituted alkaryloxy, or R_2 and R_3 together, R_3 and R_4 together, R_4 and R_5 together and/or R_5 and R_6 together form an aryl group;

20 provided only that least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, alkaryloxy or substituted alkaryloxy.

10. A feeding stimulant as claimed in claim 9 wherein R_1 is selected from the group consisting of hydrogen, alkyl, aryl and alkaryl.

11. A feeding stimulant as claimed in claim 10 wherein R_1 is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

12. A feeding stimulant as claimed in claim 11 wherein R_1 is hydrogen.

13. A feeding stimulant as claimed in any one of claims 9 to 12 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, alkaryl, and alkaryloxy.

5

14. A feeding stimulant as claimed in claim 13 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

10

15. A feeding stimulant as claimed in claim 14 wherein R_2 or R_6 is hydroxyl.

16. A feeding stimulant as claimed in claim 14 wherein R_3 or R_5 is hydroxyl.

17. A feeding stimulant as claimed in claim 14 wherein R_4 is hydroxyl.

20 18. A feeding stimulant as claimed in claim 1 wherein said compound is selected from the group consisting of:

p-hydroquinone

quinhydrone

catechol

25

resorcinol

phloroglucinol

4-methoxyphenol

methoxyhydroquinone

1,4-dimethoxybenzene

30

4-phenoxyphenol

phenylhydroquinone

4-benzyloxyphenol

19. A feeding stimulant as claimed in claim 1 wherein said compound has a plurality of aryl moieties.
20. A feeding stimulant as claimed in claimed 19 wherein
5 each said aryl moiety is a benzene ring.
21. A feeding stimulant as claimed in claim 20 wherein said compound is a polyphenylether.
- 10 22. A feeding stimulant as claimed in any one of claims 1 to 21 further comprising a biologically acceptable carrier and/or extender.
23. A method of stimulating feeding activity in termites,
15 comprising the steps of:
- (1) providing a feeding stimulant as claimed in any one of claims 1 to 22; and
 - (2) applying said feeding stimulant to a locus.
- 20 24. A feeding stimulant as claimed in claim 23 wherein there is a food source at said locus.
25. A method of attracting termites to a locus, comprising the steps of:
- 25 (1) providing a food source at said locus;
- (2) providing a feeding stimulant as claimed in any one of claims 1 to 22; and
 - (3) applying said feeding stimulant to said locus.
- 30 26. A bait for attracting termites, comprising:
- (1) a food source; and
 - (2) a feeding stimulant as claimed in any one of claims 1 to 22.

27. A bait as claimed in claim 26 wherein said food source is a source of cellulose.

28. A bait as claimed in claim 27 wherein said food source is selected from the group consisting of paper, cardboard, canite, chipboard, sound wood and fungally decayed wood.

29. A bait as claimed in any one of claims 26 to 28 further comprising a termiticidal substance.

30. A bait as claimed in claim 29 in which said termiticidal substance is a chitin synthesis inhibitor or an insect growth regulator.

31. A bait as claimed in any one of claims 26 to 30 further comprising an antioxidant.

32. A bait as claimed in any one of claims 26 to 31 further comprising a synergist and/or other attractants.

33. A bait as claimed in any one of claims 26 to 32 further comprising nutrients such as nitrogen-containing compounds and carbohydrates.

34. A termiticidal composition comprising:

- (1) a termiticidal substance; and
- (2) a feeding stimulant as claimed in any one of claims 1 to 22.

35. A termiticidal composition as claimed in claim 34 wherein said termiticidal substance is a chitin synthesis inhibitor or insect growth regulator.

36. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used for stimulating feeding activity in termites.

5

37. A compound as claimed in claim 36 of general formula I as defined in claim 9.

38. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used to attract termites to a locus.

39. A compound as claimed in claim 38 of general formula I as defined in claim 9.

40. The use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, in stimulating feeding activity in termites.

41. The use of a compound as claimed in claim 40 wherein said compound is of general formula I as defined in claim 9.

25

42. The use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, in attracting termites to a locus.

30

43. The use of a compound as claimed in claim 42 wherein said compound is of general formula I as defined in claim 9.

44. The use of a compound in the manufacture of a bait for attracting termites, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
5 compounds thereof.

45. The use of compound as claimed in claim 44 wherein said compound is of general formula I as defined in claim
9.

10

46. The use of a compound in the manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
15 compounds thereof.

47. The use of a compound as claimed in claim 46 wherein said compound is of general formula I as defined in claim
9.

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(21) International Application Number: PCT/AU99/01033 (22) International Filing Date: 25 November 1999 (25.11.99) (30) Priority Data: PP 7842 22 December 1998 (22.12.98) AU (71) Applicant (for all designated States except US): COMMON-WEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION [AU/AU]; Limestone Avenue, Campbell, ACT 2612 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): REINHARD, Judith [DE/DE]; Albrechstrasse 97, D-12167 Berlin (DE). LACEY, Michael, James [AU/AU]; 41 Glasgow Street, Hughes, ACT 2605 (AU). LENZ, Michael [AU/AU]; 8 Sutor Street, Ainslie, ACT 2602 (AU). (74) Agent: GRIFFITH HACK; G.P.O. Box 3125, Brisbane, QLD 4001 (AU).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.	
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(57) Abstract			
A feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.			

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TERMITE ATTRACTANT AND/OR FEEDING STIMULANT

TECHNICAL FIELD

5 The present invention is concerned with attractants and/or feeding stimulants for termites and, more particularly, with attractants and/or feeding stimulants for use in termite baits and as a component of termiticidal compositions.

10 BACKGROUND ART

Organochlorines have underpinned termite control around the world including in Australia, for many decades. With the ban on the use of organochlorines for termite control in Australia since 1995 and earlier or at similar
15 times in other countries, increasing efforts are being mounted to develop alternative termite management systems. Bait systems for the control of active termite infestations are considered increasingly the key management option for such situations.

20 In bait systems termites are offered a matrix on which the insects ought to feed in preference to other food sources available to a termite colony. Termites either take up a slow-acting, non-repellent lethal product which is incorporated into the food (matrix) or the termites
25 which aggregate in the matrix are directly treated with such a product. In both scenarios the agent is transported into the nest by the foragers and there distributed throughout the colony either via food exchange or mutual grooming between nest mates.

30 Following considerable research around the world there is now a growing awareness that just finding an effective bait toxin, initially thought to be the main impediment to the application of baits, is no guarantee at all that a

bait system will work effectively in practice. Control strategies relying on baits have to cope with the fact that termites have a choice and that the insects cannot be forced to make contact with the baits. Termites have to be able to locate a bait station in the first place, and once it is found, be attracted to it in significant numbers so that adequate transfer of the toxin from the bait site to the colony can occur. Differences in behaviour between species of termite, between colonies within a species and between conditions at various sites potentially restrict the effectiveness of this control strategy. Currently used bait matrices, in most cases just straight cellulose products (timber, cardboard, paper), do not necessarily ensure contact and build up of termite numbers in bait stations in a reliable, predictable fashion.

Attempts have been made to enhance the attraction of termites to bait matrices through the addition of attractant compounds. For example, International Application W099/07218 describes the use of 2,4 heptadienal as an attractant for social pest insects such as wasps and termites. United States Patent No. 5,637,298 describes 2-4 naphthalenemethanol derivative substituted at the 7 or 8 position of the naphthalene ring structure by methyl, ethyl, propyl or isopropyl, and indicates that these compounds increase bait acceptance by termites. Likewise, United States Patent No. 5,756,114 describes the incorporation of certain aromatic compounds including resorcylic acid, protocatechuic acid and vanillic acid into baits on the basis that they act as food odour attractants. These compounds apparently mimic the trail-marking pheromone (Z,Z,E)-3,6,8-dodecatrien-1-ol. Thus, while they promote termite aggregation they do not necessarily stimulate feeding behaviour, and any increased feeding may

be a consequence only of the increased numbers of termites at a selected site.

Termites are social insects and the social organisation of termite colonies largely depends on chemical signals present in the environment or produced by members of the colony. These signals modulate a variety of behaviours including foraging for food or communal exploitation of a food source. For example, during feeding, termites release a chemical signal from an exocrine gland that stimulates nest mates to feed at the same site, thereby ensuring a rapid and efficient exploitation of the food source.

All species of termite have paired labial glands located in the thorax. The glandular ducts join in the head with those of the water sacs and the contents are secreted from the mouth as saliva. This secretion has been reported to have various functions depending on the species, and has variously been identified as a defensive substance in soldier termites, a regulator of nest microclimate, a supporter of fungal cultivation in the nest or as a social nutrient. In addition, the labial glands have been said to secrete a cementing substance for nest construction or gallery building and have been identified as a source of digestive enzymes.

More recently, Reinhard et al., *Journal of Chemical Ecology*, Vol. 23 No. 10, 1997 concluded that the labial gland secretion may play a pheromonal role during food exploitation, and that this might be a general phenomenon in termites. Reinhard et al. took labial gland extracts and used these in feeding choice tests. They observed that the labial gland secretion carries a signal that stimulates gnawing and feeding by termite workers during food exploitation. The extract of the labial gland even

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elicited feeding behaviour when applied without food onto glass plates. These extracts were tested with both *Reticulitermes santonensis* and *Schedorhinotermes lamanianus* and proved to elicit a significant feeding preference in the two species. In view of this, Reinhard et al. suggested that the signal function of the labial gland secretion for food exploitation is phylogenetically old and non-species specific. The chemical signal has now been identified for the first time and has proved to work as a powerful feeding stimulant at natural low concentrations on a wide range of termite species. In view of this a class of compounds which stimulate termite feeding has been identified.

15 DISCLOSURE OF THE INVENTION

According to a first aspect of the present invention there is provided a feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

Where the feeding stimulant is a compound in which at least one R is an organic group it may have feeding stimulating activity or may be a pre-cursor of a compound with feeding stimulating activity.

In the former case, the organic group is preferably selected from the group consisting of alkyl, substituted alkyl, aryl or substituted aryl, and in the latter case is typically a compound which is hydrolysed to one having feeding stimulating activity, such as those in which the organic group is a carbohydrate moiety. β -Arbutin is one such compound. Polymers or oligomers such as polyphenylethers, as well as being long-lived in the

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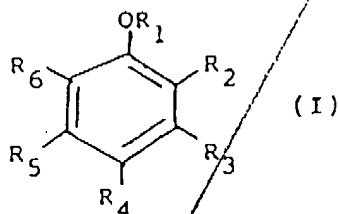
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environment, will progressively hydrolyse to compounds having feeding stimulating activity.

Compounds having feeding stimulating activity typically have an aromatic nucleus substituted by said at least two OR groups.

Typically such compounds have the following general formula I:



15 wherein R_1 is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl, and substituted aralkyl;

R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, alkaryl, substituted alkaryl, alkaryloxy and substituted alkaryloxy, or R_2 and R_3 together, R_3 and R_4 together, R_4 and R_5 together and/or R_5 and R_6 together form an aryl group;

25 provided only that at least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, alkaryloxy or substituted alkaryloxy.

Preferably, R_1 is selected from the group consisting of hydrogen, alkyl, aryl and alkaryl.

30 More preferably, R_1 is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

More preferably still, R_1 is hydrogen.

Preferably, R_2 , R_3 , R_4 , R_5 and R_6 are independently

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selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, alkaryl, and alkaryloxy.

More preferably, R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of
5 hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

More preferably still, at least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl. In particular, R_2 or R_6 , R_3 or R_5 or R_4 is typically hydroxyl.

10 Particularly preferred compounds for use in the present invention are selected from the group consisting of:

p-hydroquinone (1,4-dihydroxybenzene)
catechol (1,2-dihydroxybenzene)
15 resorcinol (1,3-dihydroxybenzene)
phloroglucinol (1,3,5-trihydroxybenzene)
4-methoxyphenol
methoxyhydroquinone (1-methoxy-2,5-dihydroxybenzene)
1,4-dimethoxybenzene
20 4-phenoxyphenol
phenylhydroquinone
4-benzyloxyphenol

Moreover, addition compounds such as quinhydrone (an addition compound of 1 mole hydroquinone and 1 mole
25 quinone) are also envisaged.

Alternatively, said compound may have a plurality of aryl moieties.

Preferably each said aryl moiety is a benzene ring and the compound is a polyphenylether. Typically, the
30 polyphenylether is an ether of p-hydroquinone having between 2 and 5 p-hydroquinone residues.

The composition may further comprise a biologically acceptable carrier and/or extender.

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As used throughout the specification and claims the term "alkyl" refers to straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

5 As used throughout the specification and claims the term "substituted alkyl" refers to an alkyl radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen,
10 alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification the term "aryl" refers to a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the
15 heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryl" refers to an aryl radical substituted by any substituent, conveniently, by hydroxyl,
20 alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "alkoxy" refers to an alkoxy radical containing a
25 straight or branched chain alkyl radicals, preferably C₁-C₁₀ alkyl radicals and, more preferably, C₁-C₄ alkyl radicals.

As used throughout the specification and claims the term "substituted alkoxy" refers to an alkoxy radical substituted by any substituent, conveniently, by hydroxyl,
30 alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

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As used throughout the specification and claims the term "aryloxy" refers to an aryloxy radical containing a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted aryloxy" refers to an aryloxy radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "alkaryl" refers to an alkaryl radical comprising a straight or branched chain alkylene radical, preferably a C₁-C₁₀ alkylene radical and, more preferably, a C₁-C₄ alkylene radical and a six-membered carbocyclic aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

As used throughout the specification and claims the term "substituted alkaryl" refers to an alkaryl radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino, halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims the term "alkaryloxy" refers to an alkaryloxy radical containing a straight or branched chain alkyleneoxy group, preferably a C₁-C₁₀ alkyleneoxy group and, more preferably, C₁-C₄ alkyleneoxy group, and a six-membered carbocyclic

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aromatic ring or a five- or six-membered heterocyclic aromatic ring containing 1, 2 or 3 oxygen, nitrogen or sulphur atoms as the heteroatom, and includes fused ring systems containing a plurality of such rings.

5 As used throughout the specification and claims the term "substituted alkaryloxy" refers to an alkaryloxy radical substituted by any substituent, conveniently, by hydroxyl, alkoxy, carboxy, carboxyalkyl, carbamoyl, carbamido, amino, mono- or di- alkyl substituted amino,
10 halogen, alkylcarbonyloxy or alkylcarbonylamino.

As used throughout the specification and claims, the words "comprise", "comprises" and "comprising" are used in a non-exclusive sense, except where the context requires otherwise.

15 According to a second aspect of the present invention there is provided a method of stimulating feeding activity in termites, comprising the steps of:

(1) providing a feeding stimulant as described above; and

20 (2) applying said feeding stimulant to a locus.

Preferably, there is a food source at said locus.

According to a third aspect of the present invention there is provided a method of attracting termites to a locus, comprising the steps of:

25 (1) providing a food source at said locus,

(2) providing a feeding stimulant as described above; and

(3) applying said feeding stimulant to said locus.

The compounds of general formula I act as a feeding
30 stimulant and/or attractant to termite species, in particular, to *Mastotermes darwiniensis*, *Coptotermes acinaciformis*, *Kalotermes flavicollis*, *Cryptotermes brevis*, *Hodotermes mossambicus*, *Zootermopsis angusticollis*.

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Reticulitermes flavipes, *Reticulitermes* *santonensis*,
Heterotermes indicola, *Schedorhinotermes lamanianus*,
Coptotermes formosanus, *Nasutitermes nigriceps*,
Nasutitermes exitiosus, *Trinervitermes trinervoides* and
5 *Macrotermes subhyalinus*.

According to a fourth aspect of the present invention there is provided a bait for attracting termites, comprising:

- (1) a food source; and
- 10 (2) a feeding stimulant as described above.

Typically the food source is a source of cellulose such as paper, cardboard, canite, chipboard, and sound or fungally decayed wood. The compound of general formula I is applied to the bait matrix in any convenient manner,
15 such as by spraying a solution of the compound on the bait matrix, soaking the bait matrix in such a solution or by admixture with a solid compound of general formula I.

The bait matrix may also contain synergists and other attractants, as well as beneficial components such as
20 nitrogen-containing compounds, carbohydrates and the like as nutrients.

Where necessary, antioxidants such as BHT, BHA or tocopherols may be added to stabilise the active compound within the bait. A controlled release system for the
25 compound of general formula I may be employed where desirable.

Preferably, the bait matrix includes added toxins such as chitin synthesis inhibitors, insect growth regulators and other termiticides. Alternatively, termiticidal
30 substances can be applied to the bait matrix once it has been deployed in the field and has attracted a significant number of termites. In either case, it is preferred that the toxin be slow-acting and non-repellent so as to be

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transported into the nest by foragers and there distributed throughout the colony either via food exchange or mutual grooming between the nest mates.

According to a fifth aspect of the present invention
5 there is provided a termiticidal composition comprising:

- (1) a termiticidal substance; and
- (2) a feeding stimulant as described above.

According to a sixth aspect of the present invention
there is provided a compound having at least two OR groups,
10 each of which is a substituent of an aryl moiety, and R is
hydrogen or an organic group, and addition compounds
thereof, when used for stimulating feeding activity in
termites.

According to a seventh aspect of the present invention
15 there is provided a compound having at least two OR groups,
each of which is a substituent of an aryl moiety, and R is
hydrogen or an organic group, and addition compounds
thereof, when used to attract termites to a locus.

According to an eighth aspect of the present invention
20 there is provided the use of a compound having at least two
OR groups, each of which is a substituent of an aryl
moiety, and R is hydrogen or an organic group, and addition
compounds thereof, in stimulating feeding activity in
termites.

25 According to a ninth aspect of the present invention
there is provided the use of a compound having at least two
OR groups, each of which is a substituent of an aryl
moiety, and R is hydrogen or an organic group, and addition
compounds thereof, in attracting termites to a locus.

30 According to a tenth aspect of the present invention
there is provided the use of a compound in the manufacture
of a bait for attracting termites, said compound having at
least two OR groups, each of which is a substituent of an

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aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

According to an eleventh aspect of the present invention there is provided the use of a compound in the
5 manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.

Typically, the compound having at least two OR groups
10 is a compound of general formula I as described above.

It has been found that para-hydroquinone is the natural feeding stimulant, but exists in the labial glands of termites almost entirely as its glucose conjugate, 4-hydroxyphenyl- β -D-glucopyranoside, which is commonly called
15 β -arbutin. β -Arbutin and glucose conjugates of the other compounds of general formula I may also be used in the invention described above. In particular, β -arbutin or glucose conjugates of the other compounds of formula I can be incorporated into a bait matrix and, through slow decay
20 generating an active compound of general formula I, could act as a slow-release system.

BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the invention will now be
25 described, by way of example only, with reference to the following examples.

Example 1 - Use of Labial Glands Extracts as Termite Attractants

30 In order to prepare labial gland extracts, termites were killed and the paired labial glands were removed. The labial glands were disrupted by freezing them for 15 minutes at -20°C and extracted with 0.6 ml of water for 12

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hours at room temperature. Then the extract was frozen at -20°C until used. The labial gland extracts prepared and tested are listed in Table 1. Each extract was chemically analysed for the presence of para-hydroquinone, and it was found to be present in all. Selected extracts were used in a bioassay to establish feeding choice, as indicated in Table 1, below.

Table 1: Labial gland extracts prepared and tested

Termite species	No. of glands Extracted	Chemically Analysed	Bioassayed
<i>Kalotermes flavicollis</i>	40	+	
<i>Cryptotermes brevis</i>	70	+	+
<i>Mastotermes darwiniensis</i>	30	+	+
<i>Hodotermes mossambicus</i>	40	+	
<i>Zootermopsis angusticollis</i>	40	+	
<i>Reticulitermes flavipes</i>	70	+	+
<i>Reticulitermes santonensis</i>	70	+	+
<i>Heterotermes indicola</i>	120	+	
<i>Schedorhinotermes lamanianus</i>	60	+	
<i>Coptotermes formosanus</i>	70	+	+
<i>Coptotermes acinaciformis</i>	80	+	+
<i>Nasutitermes nigriceps</i>	60	+	
<i>Nasutitermes exitiosus</i>	70	+	+
<i>Trinervitermes trinervoides</i>	30	+	
<i>Macrotermes subhyalinus</i>	40	+	

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The methodology employed in the choice tests was that used by Reinhard et al. *supra*. In these experiments the termites were housed in a suitable container with access via a silicone tube to a foraging arena. In each experiment two semicircles of moist filter paper (2.5cm in diameter) were placed close beside each other in the arena. One of the two semicircles was randomly chosen for application of one of the 25µl aliquots of labial gland extract and then

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moistened with water. The other semicircle was just moistened. Feeding in termites is expressed by gnawing behaviour, which can be easily recognised by the hypognathous head positions wherein the termites bore their mandibles into the food and wriggle their heads trying to tear off little pieces, which they can then transport back to the nest.

The distribution of the first 20 gnawing/feeding termites on the semicircles was registered. For example, it was observed that 19 of 20 *Mastotermes darwiniensis* termites responded by gnawing and eating the filter paper treated with one equivalent of its labial gland secretion while only one termite responded to the control. Similarly, 18 of 20 *C. acinaciformis* termites responded by gnawing and eating the filter paper treated with 2.5 equivalents of its labial gland secretion while 2 responded to the control. A further important observation was that termites of selected species also responded strongly in the bioassay to labial gland secretion from an unrelated species. For instance, *C. acinaciformis* termites responded to a test paper treated with one equivalent of *M. darwiniensis* gland secretion while *M. darwiniensis* termites responded to a test paper treated with 2.5 equivalents of *C. acinaciformis* gland secretion. These results demonstrate that the labial gland extract is a non-specific feeding stimulant for termites. The results are summarised in Table 2.

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Table 2: Natural lures

Termite species Responding to lure	Origin of labial gland Extract	Quantity of extract (gland equivalents)	Response
<i>N.darwiniensis</i>	<i>M.darwiniensis</i>	1	+++
	<i>C.acinaciformis</i>	2.5	+++
<i>C.acinaciformis</i>	<i>M.darwiniensis</i>	1	+++
	<i>C.acinaciformis</i>	2.5	+++

An analysis of the labial gland extract shows that para-hydroquinone is present at low levels, usually less than 10^{-10} grams per gland, but is present at much higher concentrations in the saliva. β -arbutin is present in high concentrations in the glands but is no longer evident in the saliva. Presumably β -arbutin is broken down enzymatically into para-hydroquinone and glucose during release of the termite's saliva, hence it was postulated that para-hydroquinone was the principal chemical feeding stimulant.

Example 2 - Synthetic Compounds as Termite Attractants

Feeding choice tests were conducted with para-hydroquinone and a number of related chemical substances in the manner described above in Example 1. The experimental data is summarised in Table 3.

Table 3: Synthetic lures

Termite species responding to lure	Compound	Quantity in Lure (ng)	Response
<i>M. darwiniensis</i>	p-hydroquinone	5	+++
	Quinhydrone	5	++
	Catechol	5	-/+
	Resorcinol	5	+
	Phloroglucinol	5	-/+
	4-methoxyphenol	5	+
	Methoxyhydroquinone	5	+
	1,4-dimethoxybenzene	5	++
	4-phenoxyphenol	5	-/+
	phenylhydroquinone	5	+
	polyphenylether*	5	+
	4-benzyloxyphenol	5	-/+
<i>C. acinaciformis</i>	p-hydroquinone	1	+++
	quinhydrone	5	++
	catechol	5	++
	resorcinol	5	++
	phloroglucinol	5	++
	4-methoxyphenol	5	+
	methoxyhydroquinone	5	+
	1,4-dimethoxybenzene	5	+
	4-phenoxyphenol	5	-/+
	phenylhydroquinone	5	-
	polyphenylether*	5	-
	4-benzyloxyphenol	5	-
<i>S. actuosus</i>	p-hydroquinone	5	+++
<i>C. brevis</i>	p-hydroquinone	5	+++
<i>N. exitiosus</i>	p-hydroquinone	5	+++
<i>R. santonensis</i>	p-hydroquinone	5	+++
<i>R. flavipes</i>	p-hydroquinone	5	+++
<i>C. formosanus</i>	p-hydroquinone	5	+++

* Mixture comprising mainly a pentamer of p-hydroquinone, but including dimer and trimer of p-hydroquinone as impurities.

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When synthetic lures were tested, none of the principal labial gland constituents (glucose, inositols, D-arbutin) elicited any feeding stimulation, except at unnaturally high concentrations where they probably served a nutritional role as food supplements. However p-hydroquinone elicited feeding stimulation at natural trace levels in the laboratory bioassays. For instance the threshold for attraction was 5 nanograms p-hydroquinone (50 picomoles) for *M. darwiniensis* and 100 picograms p-hydroquinone (1 picomole) for *C. acinaciformis*. Thus, there are different lower thresholds of feeding stimulation for different termite species.

Synthetic compounds somewhat related in molecular structure to hydroquinone also elicited feeding responses from *M. darwiniensis* and *C. acinaciformis* in the laboratory bioassays, as shown in Table 3.

Example 3 - Mode of Attraction

The mode of attraction of termites to the para-hydroquinone source may well include both olfactory and gustatory stimulation. The attractivity of para-hydroquinone over distance (olfactory perception) was tested both in empty and sand-filled plastic arenas (ID 14.5 cm, height 1 cm, covered with a glass plate), which were attached via a silicone tube to the housing container of the termites. Tests were carried out with *M. darwiniensis* and *C. acinaciformis*. Per test, two treated filter papers (25ng - 25µg p-hydroquinone and water as control, respectively) were placed in opposite positions in the arenas. The direction of the tunnel/galleries built and the behaviour of a foraging termites in reference to the position of the filter papers were evaluated. In all tests both termite species built tunnels/galleries in direction

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to the p-hydroquinone-treated filter paper, never towards the control filter paper. When foraging the termites usually walked slowly in a zigzag way, but when in proximity of the source of p-hydroquinone (ca. 5-6 cm), their behaviour changed suddenly: they walked straight and fast to the treated filter paper. Based on these observational data we concluded that the vapour of p-hydroquinone creates an "active space" of several centimetres, which once perceived directs the termites towards the source of the vapour by the concentration gradient. This active space did not get larger with increased p-hydroquinone concentration.

Example 4 - Choice Feeding Tests

Laboratory colonies of *Mastotermes darwiniensis* and *Coptotermes acinaciformis* have been tested in a choice feeding test (mimicking an actual bait situation in the field) with pieces of *Eucalyptus regnans* wood (ca. 3.5g). The colonies (ca. 500 termites in *M. darwiniensis*, 2000 termites in *C. acinaciformis*) were housed in plastic containers. Plastic arenas of 5cm diameter, 3.5cm high were attached with perspex tubes on opposite sides of the colony container. In these arenas the wood was offered: one treated with 20ng p-hydroquinone, dissolved in water, the other just moistened as control. The wood was dried and weighed before and after the test, the difference in weight as the amount eaten by termites was analysed after 3 days, 1 week and 4 weeks.

After 3 days and one week both *M. darwiniensis* and *C. acinaciformis* had eaten significantly more of the wood treated with the feeding stimulant than of the control (See Table 4). After 4 weeks the effect was gone. Therefore p-hydroquinone does act as feeding stimulant in a choice

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feeding test, although as only a little p hydroquinone was applied, the effect was only short-term. This could be improved when testing the signal in the field under natural conditions and with complete termite colonies.

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Table 4: Laboratory choice feeding tests with *Mastotermes darwiniensis* and *Coptotermes acinaciformis*: Amount wood eaten [g] after 3 days, one week and four weeks, comparing wood treated with 20ng p-hydroquinone to control (mean \pm sd, n=20, Wilcoxon-Matched-Pairs-Test, ***: significant difference at $p < 0.001$, n.s.: no significant difference).

Species	Duration of trial	Treated wood eaten [g]	Control wood eaten [g]	P
<i>M. darwiniensis</i>	3 days	0.234 \pm 0.139	0.121 \pm 0.108	***
	1 week	0.737 \pm 0.557	0.506 \pm 0.527	**
	4 weeks	2.397 \pm 0.968	2.255 \pm 0.918	n.s.
<i>C. acinaciformis</i>	3 days	0.056 \pm 0.036	0.032 \pm 0.033	**
	1 week	0.185 \pm 0.159	0.096 \pm 0.109	**
	4 weeks	1.162 \pm 0.851	1.209 \pm 0.929	n.s.

Example 5 - Field Trials

Colonies of *Coptotermes lacteus* (ACT), *Coptotermes acinaciformis* (NT) and *Mastotermes darwiniensis* (NT) have been used for large baiting trials in the field. Furthermore *Coptotermes frenchi* (ACT), *Nasutitermes exitiosus* (NSW), *Schedorhinotermes actuosus* (NT), *Coptotermes travians* (Malaysia) and *Coptotermes curvignathus* (Malaysia) have been tested exemplarily at infestation sites in urban areas and in the field. Paper towel of ca. 10g was used as bait matrix. It was either treated with 20 μ g hydroquinone (dissolved in water) or moistened with water only (=control). The paper was folded and stuffed in plastic tubes. Termites had access to the bait material through holes drilled into the tubes. One

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treated and one control bait each were placed at feeding/infestation sites of the field colonies. In case of the larger field trials, up to 24 colonies per species had been selected, and drums filled with wood had been dug into the soil around colonies as feeding sites. Baits were placed on top of the infested drums and covered with plastic foil and soil. In case of the exemplary trials single infestation sites have been selected and the baits were attached directly onto the infestation and covered with plastic foil and soil, or cardboard to ensure minimum disturbance. Baits were checked after 1 to 4 days or after 2 weeks, depending on species and activity. The amount of paper eaten and the number of termites were analysed.

As usual in natural field colonies there was a strong variation of data between colonies, therefore for statistical analysis data had to be transformed into log and square root, respectively. In the large field trials *C. lacteus*, *M. darwiniensis* and *C. acinaciformis* had all consumed significantly more of the bait material and there were more termites attracted to the baits, when hydroquinone had been applied (See Table 5). The exemplary tests with *C. frenchi*, *S. actuosus*, *C. travians* and *C. curvignathus* all indicated increased feeding activity on treated baits over control baits (See Table 6). Tests with *N. exitiosus* showed no feeding activity even after long exposure, due to the difficult dietary preferences of this species. However, we could still show increased termite presence in treated baits compared to control baits (See Table 6). We therefore conclude that hydroquinone in fact acts also under natural conditions in the field as strong and effective attractant and feeding stimulant on various termite species, when added to baits.

Table 5: Field baiting trials with *Coprotormes lacteus* (ACT), *Coptotermes acinaciformis* (NT) and *Mastotermes darwiniensis* (NT). (W): Amount bait material eaten [g] and (No): number of termites [N] in baits, comparing baits treated with 20µg hydroquinone to control baits (mean ± SE, Paired Samples T-test, ***: significant difference at $p < 0.001$, data transformed to log or sqrt for statistical analysis).

Species	Trial	N		Treated Bait	Control Bait	P
<i>C. lacteus</i>	3 days	17	W[g]	0.392±0.156	0.181±0.099	***
			No[N]	269.7±169.1	198.9±147.7	***
<i>M. darwiniensis</i>	2 days	12	W[g]	0.766±0.164	0.368±0.126	**
			No[N]	18.5±3.6	7.7±2.9	**
<i>C. acinaciformis</i>	2 days	16	W[g]	0.056±0.010	0.035±0.008	**
			No[N]	120.6±29.5	84.1±20.0	***

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Table 6: Exemplary field baiting trials with *Coptotermes frenchi* (ACT), *Schedorhinotermes actuosus* (NT), *Coptotermes travians* (Malaysia), *Coptotermes curvignathus* (Malaysia) and *Nasutitermes exitiosus* (NSW). Proportion bait material eaten [%] or termite presence, respectively, comparing baits treated with 20µg hydroquinone to control baits.

Species	Trial	n	Proportion eaten/termite presence (treated bait)	Proportion eaten/termite presence (control bait)
<i>C. frenchi</i>	2 weeks	3	30%	5%
			90%	0%
			30%	0%
<i>S. actuosus</i>	4 days	1	5%	0%
<i>C. travians</i>	1 day	2	20%	20%
			60%	40%
<i>C. curvignathus</i>	1 day	3	95%	20%
			50%	5%
<i>N. exitiosus</i>	2 weeks	4	Termites present	Not touched
			Termites present	Not touched
			Termites present	Not touched
			Termites present	Not touched

INDUSTRIAL APPLICABILITY

The compounds of the present invention are useful in stimulating feeding activity in termites so as to enhance the effectiveness of termite baits.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A feeding stimulant for stimulating feeding activity in termites, comprising a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof.
2. A feeding stimulant as claimed in claim 1 wherein at least one R is an organic group and said compound has feeding stimulating activity.
3. A feeding stimulant as claimed in claim 2 wherein said organic group is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl.
4. A feeding stimulant as claimed in claim 1 wherein at least one R is an organic group and said compound is a precursor of a compound with feeding stimulating activity.
5. A feeding stimulant as claimed in claim 4 wherein said compound is hydrolysed to a compound in which said at least one R is hydrogen.
6. A feeding stimulant as claimed in claim 5 wherein said organic group is a carbohydrate moiety.
7. A feeding stimulant as claimed in claim 6 wherein said compound is β -arbutin.
8. A feeding stimulant as claimed in claim 1 wherein said compound has an aromatic nucleus substituted by said at least two OR groups.

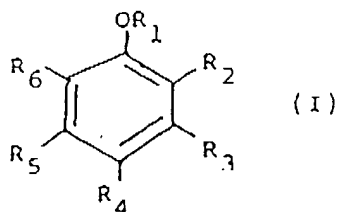
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9. A feeding stimulant as claimed in claim 8 wherein said compound has the following general formula 1:

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10 wherein R_1 is selected from the group consisting of hydrogen, alkyl, substituted alkyl, aryl, substituted aryl, aralkyl and substituted aralkyl;

R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, substituted alkyl, alkoxy, substituted alkoxy, aryl, substituted aryl, aryloxy, substituted aryloxy, alkaryl, substituted alkaryl, alkaryloxy and substituted alkaryloxy, or R_2 and R_3 together, R_3 and R_4 together, R_4 and R_5 together and/or R_5 and R_6 together form an aryl group;

20 provided only that least one of R_2 , R_3 , R_4 , R_5 or R_6 is hydroxyl, alkoxy, substituted alkoxy, aryloxy, substituted aryloxy, alkaryloxy or substituted alkaryloxy.

10. A feeding stimulant as claimed in claim 9 wherein R_1 is selected from the group consisting of hydrogen, alkyl, aryl and alkaryl.

11. A feeding stimulant as claimed in claim 10 wherein R_1 is selected from the group consisting of hydrogen, methyl, ethyl, phenyl and benzyl.

12. A feeding stimulant as claimed in claim 11 wherein R_1 is hydrogen.

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13. A feeding stimulant as claimed in any one of claims 9 to 12 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, alkyl, alkoxy, aryl, aryloxy, alkaryl, and alkaryloxy.

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14. A feeding stimulant as claimed in claim 13 wherein R_2 , R_3 , R_4 , R_5 and R_6 are independently selected from the group consisting of hydrogen, hydroxyl, methyl, ethyl, methoxy, ethoxy, phenyl, phenoxy, benzyl and benzyloxy.

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15. A feeding stimulant as claimed in claim 14 wherein R_2 or R_6 is hydroxyl.

16. A feeding stimulant as claimed in claim 14 wherein R_3 or R_5 is hydroxyl.

15

17. A feeding stimulant as claimed in claim 14 wherein R_4 is hydroxyl.

20 18. A feeding stimulant as claimed in claim 1 wherein said compound is selected from the group consisting of:

p-hydroquinone

quinhydrone

catechol

25 resorcinol

phloroglucinol

4-methoxyphenol

methoxyhydroquinone

1,4-dimethoxybenzene

30 4-phenoxyphenol

phenylhydroquinone

4-benzyloxyphenol

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19. A feeding stimulant as claimed in claim 1 wherein said compound has a plurality of aryl moieties.
20. A feeding stimulant as claimed in claimed 19 wherein
5 each said aryl moiety is a benzene ring.
21. A feeding stimulant as claimed in claim 20 wherein said compound is a polyphenylether.
- 10 22. A feeding stimulant as claimed in any one of claims 1 to 21 further comprising a biologically acceptable carrier and/or extender.
23. A method of stimulating feeding activity in termites,
15 comprising the steps of:
- (1) providing a feeding stimulant as claimed in any one of claims 1 to 22; and
 - (2) applying said feeding stimulant to a locus.
- 20 24. A feeding stimulant as claimed in claim 23 wherein there is a food source at said locus.
25. A method of attracting termites to a locus, comprising the steps of:
- 25
- (1) providing a food source at said locus;
 - (2) providing a feeding stimulant as claimed in any one of claims 1 to 22; and
 - (3) applying said feeding stimulant to said locus.
- 30 26. A bait for attracting termites, comprising:
- (1) a food source; and
 - (2) a feeding stimulant as claimed in any one of claims 1 to 22.

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27. A bait as claimed in claim 26 wherein said food source is a source of cellulose.

28. A bait as claimed in claim 27 wherein said food source is selected from the group consisting of paper, cardboard, canite, chipboard, sound wood and fungally decayed wood.

29. A bait as claimed in any one of claims 26 to 28 further comprising a termiticidal substance.

30. A bait as claimed in claim 29 in which said termiticidal substance is a chitin synthesis inhibitor or an insect growth regulator.

31. A bait as claimed in any one of claims 26 to 30 further comprising an antioxidant.

32. A bait as claimed in any one of claims 26 to 31 further comprising a synergist and/or other attractants.

33. A bait as claimed in any one of claims 26 to 32 further comprising nutrients such as nitrogen-containing compounds and carbohydrates.

34. A termiticidal composition comprising:

- (1) a termiticidal substance; and
- (2) a feeding stimulant as claimed in any one of claims 1 to 22.

35. A termiticidal composition as claimed in claim 34 wherein said termiticidal substance is a chitin synthesis inhibitor or insect growth regulator.

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36. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used for stimulating feeding activity in termites.

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37. A compound as claimed in claim 36 of general formula I as defined in claim 9.

38. A compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, when used to attract termites to a locus.

39. A compound as claimed in claim 38 of general formula I as defined in claim 9.

40. The use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, in stimulating feeding activity in termites.

41. The use of a compound as claimed in claim 40 wherein said compound is of general formula I as defined in claim 9.

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42. The use of a compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition compounds thereof, in attracting termites to a locus.

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43. The use of a compound as claimed in claim 42 wherein said compound is of general formula I as defined in claim 9.

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44. The use of a compound in the manufacture of a bait for attracting termites, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
5 compounds thereof.

45. The use of compound as claimed in claim 44 wherein said compound is of general formula I as defined in claim
9.

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46. The use of a compound in the manufacture of a termiticidal composition, said compound having at least two OR groups, each of which is a substituent of an aryl moiety, and R is hydrogen or an organic group, and addition
15 compounds thereof.

47. The use of a compound as claimed in claim 46 wherein said compound is of general formula I as defined in claim
9.



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**SUPPLEMENTARY
EUROPEAN SEARCH REPORT**

Application Number
EP 99 95 7752

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
✓ X	J. REINHARD: "Nahrungssuche und-ausbeute der Erdtermitte Reticulitermes santonensis: Rolle chemischer Signale" BAYREUTHER FORUM ÖKOLOGIE, vol. 54, 1998, pages 1-106, XP002200946 See: page 44, par. 3-4; page 46, par. 2 and Table 5; page 50, par. 2 - page 51, par. 1; Table 8; page 65, par. 2; page 71, par. 1-2; page 72, par. 2 and 4; 5.3.	1-67	A01N31/16
✓ X	US 4 880 624 A (METCALF ROBERT L ET AL) 14 November 1989 (1989-11-14) * column 4, line 41 - column 6, line 38; examples 1-5 *	1-21, 25-38, 43-45, 66,67	
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✓ X	H. J. MEYER & D. M. NORRIS: "Lignin intermediates and simple phenolics as feeding stimulants for Scolytus multistriatus" J. INSECT PHYSIOL., vol. 20, no. 10, 1974, pages 2015-2021, XP002200947 * page 2016, paragraphs 3,4; figure 2 * * page 2018, paragraph 3 * * page 2019, paragraphs 2,3 * --- -/--	1-18, 35-38	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A01N
The supplementary search report has been based on the last set of claims valid and available at the start of the search.			
Place of search MUNICH		Date of completion of the search 3 June 2002	Examiner Klaver, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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Application Number
EP 99 95 7752

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<p>The supplementary search report has been based on the last set of claims valid and available at the start of the search.</p>			
Place of search MUNICH		Date of completion of the search 3 June 2002	Examiner Klaver, J
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